

SECOND ANNUAL INVENTORY REPORT ON MAINE'S FORESTS



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Second Annual Inventory Report on Maine's Forests

Executive Summary

The USDA Forest Service, in partnership with the Maine Forest Service, began a new annual forest inventory in 1999. The new inventory system measures a 20% statewide sample of Maine's forests every year. Fieldwork began in 1999; the full 100% sample will be completed in 2003. This second interim annual report is based on data collected from 684 plots in Panel #1 and 687 plots in 2000's Panel #2. The combined data of 1999 and 2000 provide a limited snapshot of estimates of forestland area and inventory. Growth data and data to conduct long term trend analysis will not be available for at least a couple of more years. The inventory data *is* strong enough to provide the following estimates:

- Significant increases in the statewide stocking of sapling trees in both the dbh classes of 1" and 2", and in the species groups of Balsam Fir, Spruces, and Red Maple (Appendix A. Table 16A.).
- In 2000, Maine's forests had an estimated inventory of 281 million cords of merchantable wood (pulpwood quality or better); this is a significant increase (+11 %) from the 1995 inventory estimate (Appendix B. Figure 2.).
- Current pulpwood quality or better volume is estimated at an average of 16.3 cords per acre. This is an increase of 1.3 cords per acre from the 1995 estimate (Appendix B. Figure 1.).
- No significant change in net volume of growing stock trees or the board foot volume of sawtimber trees in any species group, since 1995 (Appendix A. Table 19. And Table 23.).
- Significant changes, +1.5 million acres in the Nonindustrial Private Ownership Class and a corresponding -1.3 million acres in the Forest Industry Ownership Class. A new owner group of Institutional Investor Timberlands represents the bulk of the increase (Appendix A. Table 2.).
- 87% of the timberland area is in desirable stocking classes (moderately stocked and fully stocked), essentially unchanged from the 1995 estimate. (Appendix A. Table 10.).
- Maine remains 90% forested and 97% of the forestland are productive timberland (Appendix A. Table 1.).

SECOND ANNUAL INVENTORY REPORT ON MAINE'S FORESTS

INTRODUCTION

The USDA Forest Service - Forest Inventory & Analysis, Northeastern Research Station has been the major source of state level forest inventory information for Maine. This program provides periodic information on a variety of parameters describing forests and forest use: area and type of forest; species, size, and health of trees; and rates of tree growth, mortality, and removals.

The USDA Forest Service conducted four forest inventories in Maine (1954-1958, 1968-1970, 1980-1982, and 1994-1996). These efforts have been augmented by additional inventory efforts to address specific issues. Despite this level of monitoring, Maine has faced contentious debates concerning sustainable forest management over the past decade. Until publication of new forest inventory information in 1996, the most current inventory data that was available was collected in 1980-1982. The long period between inventories has not served Maine's policy discussions well and had contributed to a high degree of uncertainty about the state of the forest resource.

In response to customer needs, the USDA Forest Service - Forest Inventory & Analysis has a new Congressional mandate (Public Law 105-185, The Agricultural Research, Extension, and Education Reform Act of 1998) to change the way they conduct forest inventories nationwide, including:

- 1) Change from a periodic to an annual forest inventory which measures 20% of all inventory plots in each state each year;
- 2) Development of consistency in the program across all forest lands;
- 3) Produce complete state reports at five-year intervals.

The 118th Maine Legislature authorized the Maine Forest Service to participate with the USDA Forest Service to implement an annual forest inventory (PL 1997 C.720). Maine was the first state in the Northeast to participate in this new inventory process, and was the first state in the nation to convert to the new national core variables. The annual inventory measures 20% of the inventory plots every year. When the 1999 plots are again revisited and completely remeasured in the sixth inventory year (2004), Maine will begin the process of a continuous annual inventory system utilizing the most recent five years of inventory data for estimation purposes.

Fieldwork under the inventory system began in April 1999 and will be completed over a five-year period. Plots are located systematically across the state on all types of ownerships. As required by law, landowners are contacted by the USDA

Forest Service for permission to access the plots. The USDA Forest Service - Forest Inventory and Analysis Unit maintains the list of exact plot locations. The plot location data is not released to any other group or individual.

The October 24, 2000 "Report Of The 1999 Annual Inventory of Maine's Forests" utilized an original Panel #1 sample of 646 plots. Concurrent to that data analysis and reporting, field crews were measuring an additional 38 plots during the 2000 measurement season. This additional sample is now assigned to Panel #1 and is considered in this analysis and reporting to be integral part of the 1999 Panel #1 dataset. A total of 684 plots now comprise the 1999 Panel #1 sample and 687 plots comprise the 2000 Panel #2 sample.

The Maine Forest Service, with the cooperation and full support of the USDA Forest Service, will produce a more enhanced interim annual report. This second annual report provides estimates of forest area; species, number, and size of trees; and volume based on the combined data collected in 1999 and 2000. It also contains a results and discussion section that extends far beyond what the USDA Forest Service intended to issue as a core interim annual report for individual states.

Both the 1999 and 2000 datasets are valid independent and separate systematic samples for estimation of various inventory populations. The first annual report issued on October 24, 2000 compared a systematic statewide sample of 646 plots to the 1995's sample of over 3,000 plots. That report found few classifications in which the respective mean estimates could be categorically stated to be significantly different at the 95% confidence level. In that report, the major constraint to those comparisons was the relative small sample size of the 1999 data. To now repeat and report on an identical comparison of just the 2000 data to the 1995 populations estimates would produce similar results, again primarily due to the relative small sample size of 687 plots in 2000.

The best use of all available data is to combine the 1999 sample of 684 plots with the 2000 sample of 687 plots and compare the combined estimates to the equivalent 1995 inventory estimates. As a rule of thumb, doubling the sample size decreases the confidence interval by a factor of 1.4, and that should allow more significant differences to be identified.

The annual inventory system is currently structured to aggregate all previous panel datasets into a single moving average and representation, the primary reason for combining the 1999 and 2000 data. The goal after 2003 is to continue to utilize and aggregate into a moving average the most current 5-year's of data available. The only reason to intensively examine a single year's worth of data would be to understand the immediate impact of a recent catastrophic event, i.e. 1938 Hurricane, 1998 Ice Storm, Hemlock Woolly Adelgid.

LIMITATIONS ON USING THE COMBINED TWO-YEAR DATASET

The annual inventory is designed to measure 20% (one-fifth) of the inventory plots every year. Estimates of forest characteristics can be derived from each annual measurement; however, the relatively small annual sample, by itself, yields estimates with lower precision than an inventory that measures all plots in a short period (the periodic inventory). Until the full five-year cycle is completed, the annual inventory may yield information that although is statistically valid, may fluctuate from year to year and cause concern or lack of confidence in some users. (1998, A. Gillespie. "Pros and Cons of Continuous Forest Inventory: Customer Perspectives." Presented at the "Integrated Tools for Natural Resources Inventories in the 21st Century" Conference, August 16-19, 1998, Boise, Idaho.)

A more powerful approach for providing more precise estimates in the annual inventory is to use a moving average, combining the latest data with all previous years data, i.e. 2000 data with the 1999 data. The reliability of estimates using a moving average will improve as we progress through the first five-year measurement cycle. The USDA-Forest Service and the Maine Forest Service have chosen to utilize this method of aggregating datasets in their interim annual reporting of inventory results. The report provided by the USDA Forest Service at the end of the five-year measurement cycle will provide more precision than this combined annual report using just two years of data.

Data on forest area and inventory from the combined dataset are reported in the tables in Appendix A. The tables correspond with the same numbered tables in the 1995 inventory report "Forest Statistics of Maine, 1995."

The combined inventory estimates are compared to the 1995 estimates using the 95% confidence limit as a statistical test of the estimated means. The 95% confidence limit is expressed as a range around the estimate of the mean. If the ranges for the two means (1995 and 2000) do not overlap, we are 95% certain that there is a statistically significant difference in the populations that were sampled to provide the estimates of those means. These statistically significant differences are noted where they occur in each of the tables in Appendix A.

Comparisons for significant differences between the combined data and the 1995 data for some classifications (Forest Type Group, Stand Size Class, and Stocking Class) can not be made, due to changes in definitions or algorithms used by the USDA Forest Service to compile the data (See footnote in Appendix A. Table 2.). The 1995 data will not be reprocessed until a series of national level algorithms is thoroughly developed and tested.

These algorithms that classify plots into a specific: Forest type; Stand Size Class; or the 2 Stocking Classes (Growing Stock and All Live) are forthcoming and will be incorporated as soon as possible. The Northeastern Research Station is staying the course and not releasing estimates that change solely due to definitional or algorithm changes.

Due to the small sample size of the combined data and as recommended by the USDA Forest Service – Forest Inventory & Analysis Unit, county level estimates are not reported. Also, some species level and diameter classes have been respectively aggregated to either species or diameter groupings. The combined data provides a valid snapshot of inventory estimates in 2000. The small sample size does not support a valid estimate of growth, nor does it allow meaningful trend analysis. The data necessary for growth estimates will not be available until the completion of the first five-year cycle, and will then be limited to only statewide estimations and other broad scale utilities.

RESULTS & DISCUSSION

TIMBERLAND AREA

- **The 2000 inventory report shows that forestland area and timberland area are stable** (Appendix A. Table 1. Current Land Area by Major Land Class.).

The 2000 inventory is based on the 1995 land use sampling scheme. The 1995 inventory used a two-stage sampling method to estimate land use classes. Over 75,000 aerial photo-points were interpreted and classified by current land class. The second phase sampled 3,000 ground plots for current land use class. This two-stage sample estimated a total of 19,753,310 acres of all land classes in Maine, with 16,952,130 acres of timberland. Therefore, the 1,371 plots measured in 1999 and 2000 sampled current land classes based on the 19.75 million land acres estimated in 1995.

The major land use class of Timberland has now been expanded to include Other Forestland and Urban Forestland as parts of the primary population of interest, acreages that are desirable, accessible, and productive; but not restricted from harvest by law or regulation.

The inclusion of Other Forestland and Urban Forestland into the Timberland grouping has added an estimated 87,735 acres (approximately 6 plots, <1% of the sample) to the 1999/2000 estimates that are not equivalently represented in the 1995 estimates. The MFS does not have the current information to restate the 1995 Inventory estimates to match the current classifications, calculated variables, and algorithms. It is our belief that these additional acres when added to this report do not create a skewed representation and that the stated comparisons and significant differences noted between the 1999/2000 data and the 1995 data are still valid.

- **The data indicates a possible increase in the Oak/Pine forest type group, and the new occurrence of estimated acreage in *Exotic Softwood Plantations* (represents specific plantations of Scotch Pine, Norway Spruce, or Hybrid Larch), Oak/Gum/Cypress (this is a single plot with a high frequency of hardwoods that prefer a very moist site), and Nonstocked forest type groups since 1995** (Appendix A. Table 2. Timberland Area by Forest Type Group and Ownership Class.) (Plantations of native species are assigned to existing forest type groups by the forest type algorithm.)
The observed changes are partly due to current changes made by the USDA Forest Service in the algorithms that calculate forest type.

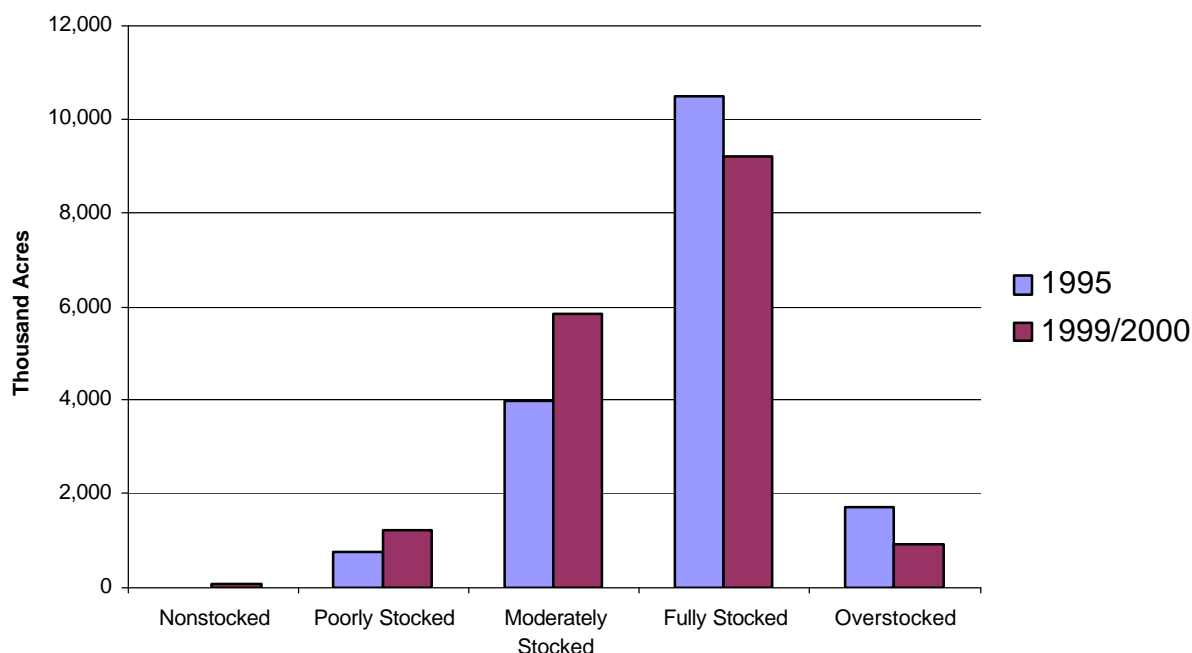
Because of the change in algorithms, MFS is unable to determine how much of the change is a real on the ground change and how much is definitional due to the new algorithms. MFS will continue to monitor, examine, and descriptively report on these changes in forest type groups, pending the complete recalculation and restatement of the 1995 data with the forthcoming national algorithms used for classifying forest type, stand size, and stocking.

Maple/Beech/Birch continues to be the most common forest type group, with 7.3 million acres, followed by the Spruce-Fir group with 5.1 million acres. These two groups represent 72% of all timberland acreages, nearly identical to their 1995-combined representation of 73%.

- **Since 1995, the combined data estimates significant changes in ownership classes, a +1.5 million acre increase in the Nonindustrial Private ownership class and a corresponding -1.3 million acre decrease in the Forest Industry ownership class** (Appendix A. Table 2. Timberland Area by Forest Type Group and Ownership Class.). These net changes reflect a new distribution of land ownership and management, as recently reported in the Department of Conservation, Maine Forest Service's *"2000 Silvicultural Activities Report – including Annual Report on Clearcutting"*, published May 25, 2001 but not yet released. That report introduced a new landowner category, *"Institutional Investor Timberlands,"* (Forestlands owned by organizations that hold assets as fiduciaries for the benefit of others), as a specific subset of the broader Nonindustrial Private category. The 1999 data previously estimated a similar acreage shift, but it took the combined sample size to make it a significant difference to the 1995 estimate.
- **Timberland acres are fairly evenly distributed among the desirable stand size classes and proportionally similar to the 1995 breakdown: Large Diameter stands represent 35%, the Medium Diameter has a 38% share, and the Small Diameter class has a 27% share of the timberland acreage** (Appendix A. Table 3. Area of Timberland by Stand Size Class and Ownership Class.).
- **The stocking class assignment, based on just growing stock trees, depicts a general downward transition to the lower stocked categories. Since 1995, the Fully and Overstocked Classes have apparent acreage decreases, with corresponding apparent increases in the Moderately, Poorly, and Nonstocked classes** (Appendix A. Table 4. Area of Timberland by Stocking Class of Growing Stock Trees and Ownership Class.).
At face value, these differences translate into an overall <1% decline in the acreage of the desirable classes of fully and moderately stocked.

- **For all live trees (1.0" dbh and larger), the stocking class assignment depicts a similar downward transition to lower stocked classes. The Fully and Overstocked classes show apparent decreases in acreage, with corresponding apparent increases in the classes of moderately and poorly stocked** (Appendix A. Table 10. Area of Timberland by Forest Type Group and Stocking Class of All Live Trees and Ownership Class. And Figure 1.).
Taken at face value, the classes of Fully and Overstocked decrease by 2.0 million acres and the Moderately stocked class increases by 1.9 million acres.
- **In 2000, 87% of timberland acres (15.1 million acres) were in desirable stocking classes (moderately and fully stocked), a minor increase from the similar 1995 classification** (Appendix A. Table 10. And Figure 1.).

Figure 1. Distribution of Timberland area by Stocking Class of All Live Trees (1.0" Dbh and larger), 1995 and Combined 1999/2000.



- While there are no significant differences in timberland acreages by basal area class, an additional analysis was conducted to examine, what, if any, patterns could be found in the distribution of stocking class and stand size class among the current landowner classes for the 0-49 sq. ft./acre basal area class (Appendix A. Table 12. Area of Timberland by Forest Type Group and Basal Area Class. And Figure 2.).

Table 1. Percentage of Timberland acres in the 0 - 49 sq. ft. basal area class - by ownership class, stand size class, and stocking class, (Basal Area is based on All Live trees tallied 1.0" dbh and larger), Maine, 1999-2000 data

		Ownership Class			
Stand Size Class and Stocking Class	Public	Forest Industry	Nonindustrial Private	Subtotal of Stocking Class	
Nonstocked Stands					
Nonstocked & Poorly Stocked	0.12%	0.17%	1.46%	1.74%	3
Moderately Stocked	0.00%	0.00%	0.00%	0.00%	
Fully Stocked & Overstocked	0.00%	0.00%	0.00%	0.00%	
Subtotal of Nonstocked Stands	0.12%	0.17%	1.46%	1.74%	
Owner Class Share of Stand Size Class	6.74%	9.70%	83.55%		100.00%
Small Diameter Stands					
Nonstocked & Poorly Stocked	0.23%	1.94%	5.74%	7.91%	1
Moderately Stocked	0.30%	9.91%	14.14%	24.35%	
Fully Stocked & Overstocked	0.94%	23.73%	21.84%	46.51%	
Subtotal of Small Diameter Stands	1.46%	35.59%	41.72%	78.77%	
Owner Class Share of Stand Size Class	1.85%	45.18%	52.96%		100.00%
Medium Diameter Stands					
Nonstocked & Poorly Stocked	1.56%	2.65%	7.83%	12.04%	
Moderately Stocked	0.00%	0.97%	0.57%	1.55%	
Fully Stocked & Overstocked	0.00%	0.06%	0.81%	0.87%	
Subtotal of Medium Diameter Stands	1.56%	3.69%	9.21%	14.45%	
Owner Class Share of Stand Size Class	10.76%	25.50%	63.74%		100.00%
Large Diameter Stands					
Nonstocked & Poorly Stocked	0.00%	1.04%	2.70%	3.74%	3
Moderately Stocked	0.00%	0.91%	0.11%	1.02%	
Fully Stocked & Overstocked	0.00%	0.14%	0.13%	0.28%	
Subtotal of Large Diameter Stands	0.00%	2.09%	2.94%	5.03%	
Owner Class Share of Stand Size Class	0.00%	41.63%	58.37%		100.00%
Ownership share of 0 - 49 sq. ft.					
basal area class	3.13%	41.54%	55.33%	100.00%	2
Ownership share of 17.31 million					
Timberland Acres	5%	35%	61%		100.00%

- 1 71% of all acres in the 0 - 49 sq. ft. basal area class are in the Small Diameter Stand Size Class and are in desirable stocking classes (moderately stocked, fully stocked, or overstocked).
- 2 When compared to its proportional share of All Timberland acres, the Forest Industry ownership class has substantially more of this basal area class than the Public or Nonindustrial owners. The management of these low basal area stands will play an important role in the development of Maine's future forests.
- 3 5.5% of the acres in the 0 - 49 sq. ft. basal area class occur in the stand size class of either Nonstocked or Large Diameter and have a undesirable Nonstocked or Poorly Stocked stocking class, 76% of the acreage in these undesirable categories occurs on Nonindustrial Private ownerships.

- There is an estimated 3.1 million acres in the 0 – 49 sq. ft. Basal Area Class (Appendix A. Table 12.). Based on the data in Table 1., 25% of the acres in this class are classified into a nonstocked or poorly stocked category, representing 787,000 acres of timberland. The current owner class of Non-industrial Private is accounts for 70% of these acres.

NUMBER OF TREES

The USDA Forest Service recommends continued aggregation of some individual species into species groups when reporting data on number of trees and volume, in order to overcome the limitations of the small sample size.

For the purposes of this report, species were aggregated to the following species groups:

<u>Species Group</u>	<u>Species</u>
Balsam Fir	Balsam Fir
Spruces	White, Red, and Black Spruce
Eastern White Pine	Eastern White Pine
Northern White Cedar	Northern White Cedar
Other Misc. Softwoods	Red Pine, Larch, Hemlock, and all other softwoods tallied
Red Maple	Red Maple
Sugar Maple/Beech/Birch	Sugar Maple, American Beech, and Yellow Birch
Intolerant Hardwoods	White Birch and Aspen/Poplar
Other Misc. Hardwoods	White Oak, Red Oak, White Ash, Black Ash, Basswood, Elm, and all other commercial hardwoods tallied
Noncommercial Hardwoods	Gray Birch and all other noncommercial hardwoods tallied

For trees 5.0” dbh and larger, the combined data show:

- **The most abundant live commercial tree species/species groups are (in descending order) Spruces, Balsam Fir, Sugar Maple/Beech/Birch, and Red Maple.** (Appendix A. Table 13. Number of Trees (5.0” dbh and larger) on Timberland by Species/Species Group and Tree Class.)
- **No significant differences occur in the number of growing stock trees in any species/species group or in any of the three diameter groupings** (Appendix A. Table 14. Number of Growing Stock Trees (5.0”

dbh and larger) on Timberland by Species/Species Group and Diameter Class Grouping.)

- **Tree Quality: 94% of live merchantable size softwood trees are either sawtimber or potential sawtimber trees. 84% of live merchantable size hardwood trees are either sawtimber or potential sawtimber trees** (Appendix A. Table 13. And Table 14. And Figure 2A. And 2B.). While these percentages are seemingly high, an examination of Figures 2A and 2B shows that only:

- 1 out of every 2.5 softwood trees advances to the sawlog size and quality category, and that only
- 1 out of every 5 hardwood trees advances to the sawlog quality and size category.

This is likely a natural phenomenon that occurs over time. Increased competition for available space and limited resources leads to mortality and a decline in vigor for a high percentage of trees (a weeding out process).

- **Tree Quality: 98% of live merchantable size softwood trees (5.0" dbh and larger) are Pulpwood Quality or Better. 96% of live merchantable size hardwood trees are Pulpwood Quality or Better.** (Appendix A. Table 13. And Table 14. And Figure 2A. And 2B.)

Figure 2A. Distribution of live merchantable size (5.0" dbh and larger) Softwood trees by Tree Class

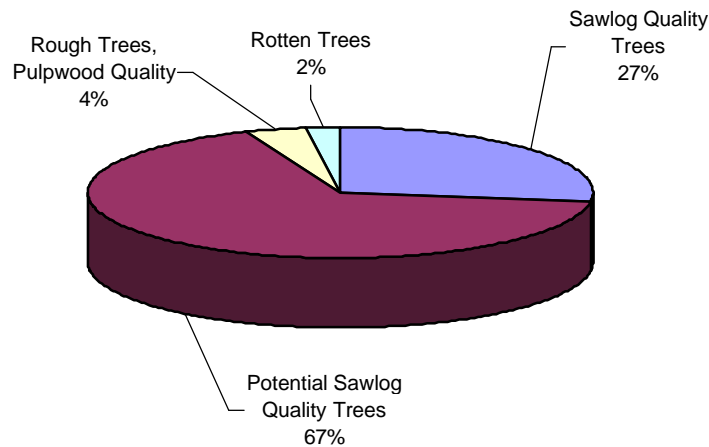
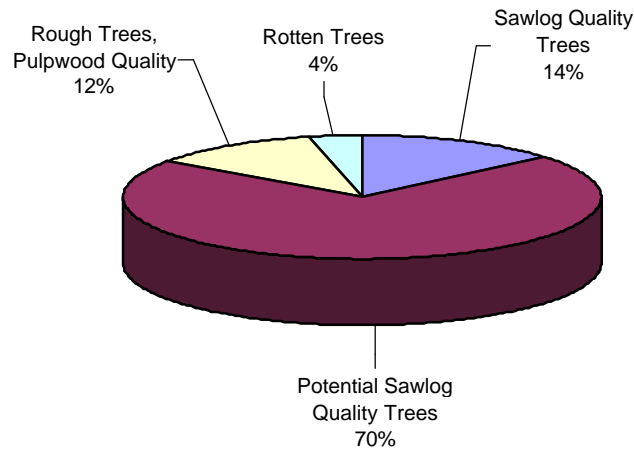


Figure 2B. Distribution of live merchantable size (5.0" dbh and larger) Hardwood trees by Tree Class

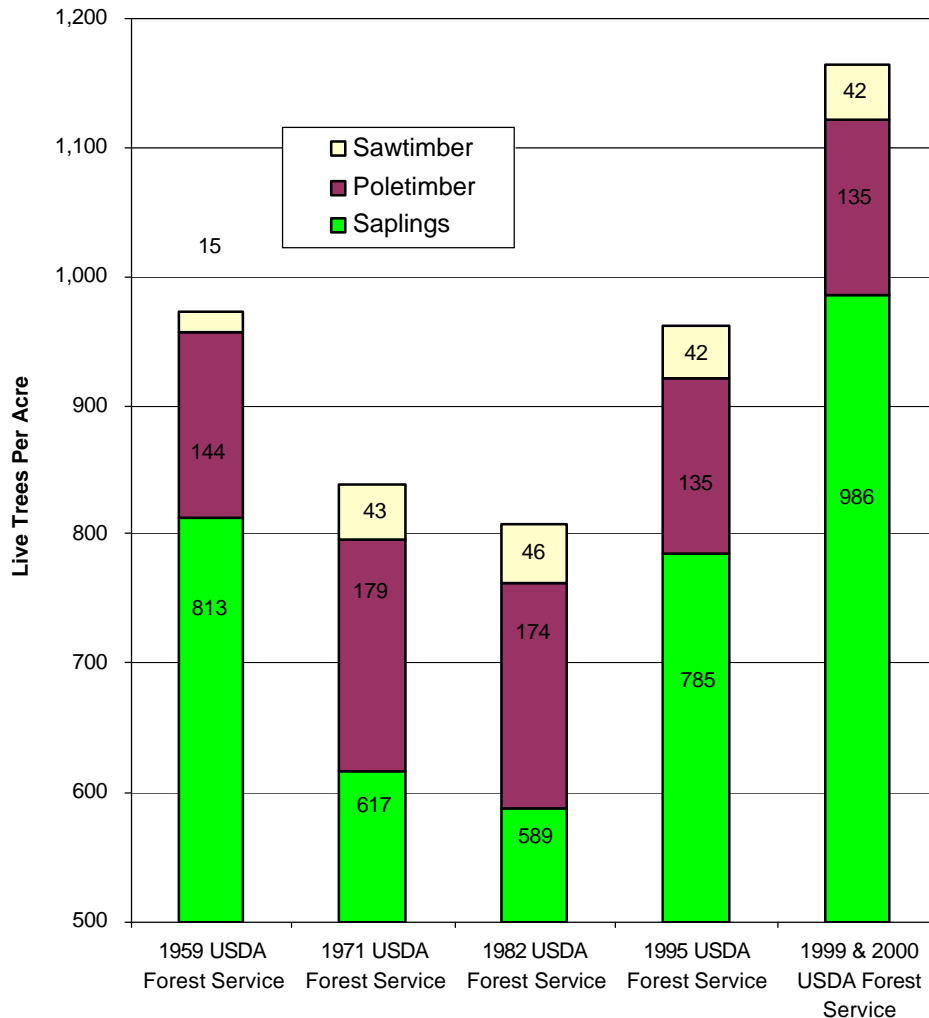


For all live trees 1.0" dbh and larger, the combined inventory shows:

- **The most abundant commercial tree species/species groups are (in descending order) Balsam Fir, Red Maple, Sugar Maple/Beech/Birch, Spruces, and Intolerant Hardwoods** (Appendix A. Table 16. Number of Live Trees (1.0" dbh and larger) on Timberland by Species/Species Group and Diameter Class Grouping.).
- **The largest increases, since 1995, in the number of live trees are (in descending order) Balsam Fir, Red Maple, and Spruces. The Balsam Fir has an order of magnitude of four times the increase of the other two noted species/species groups** (Appendix A. Table 16. Number of Live Trees (1.0" dbh and larger) on Timberland by Species/Species Group and Diameter Class Grouping.).
- **Since 1995, the only species/species group decreases in the number of live trees are Other Misc. Commercial Hardwoods and Northern White Cedar** (Appendix A Table 16.).

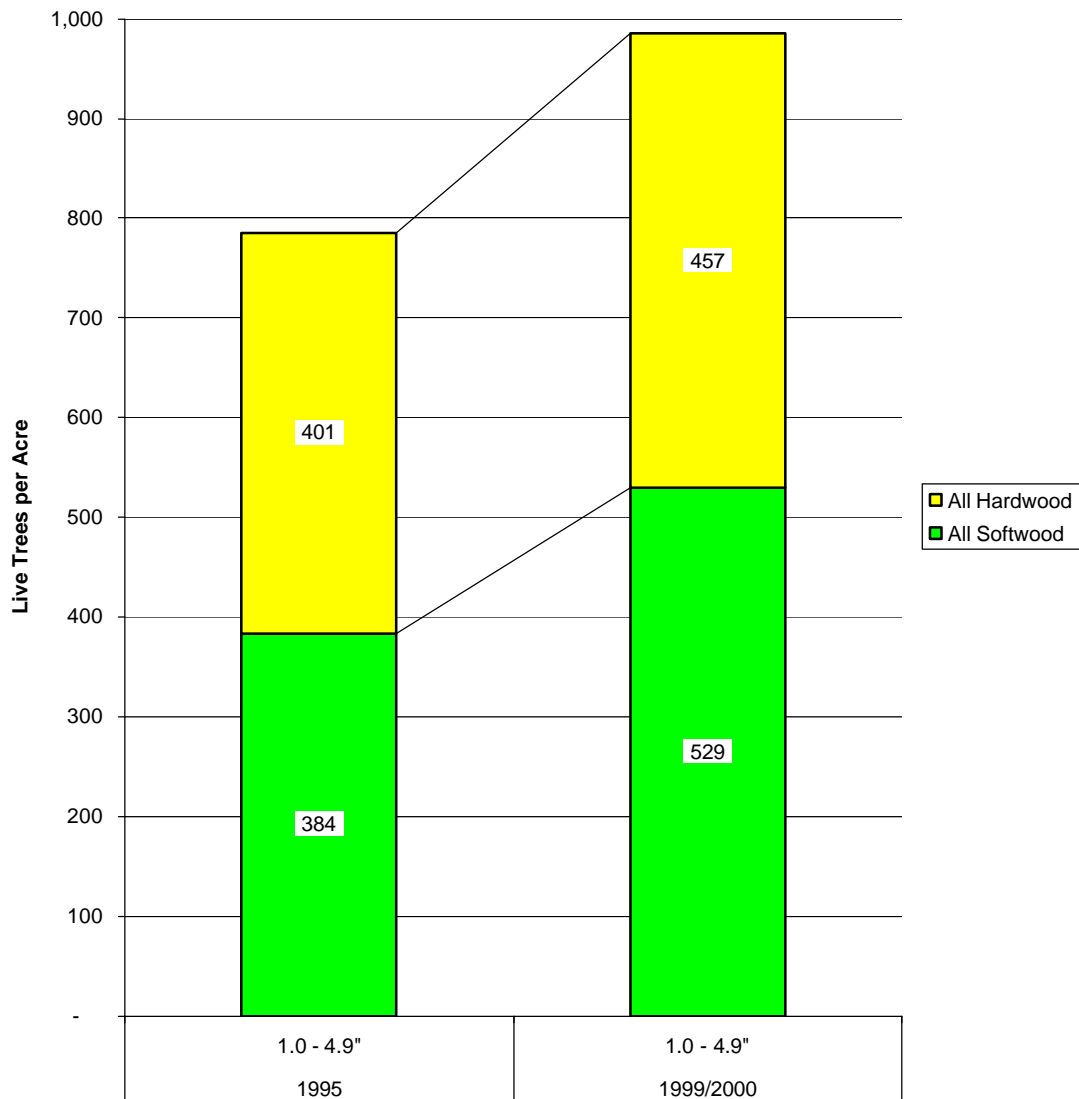
- A 34% increase in the number of all softwood trees and a 13% increase in the number of all hardwood trees have occurred since 1995. These dynamics occur primarily in the sapling diameter class (1.0" - 4.9" dbh), with an estimated 26% increase on a per acre basis (Appendix A. Table 16. And Figure 3.).

**Figure 3. Major Size Class Distribution of Live Trees per Timberland Acre
(Average Live Trees/Acre by DBH Grouping displayed)**



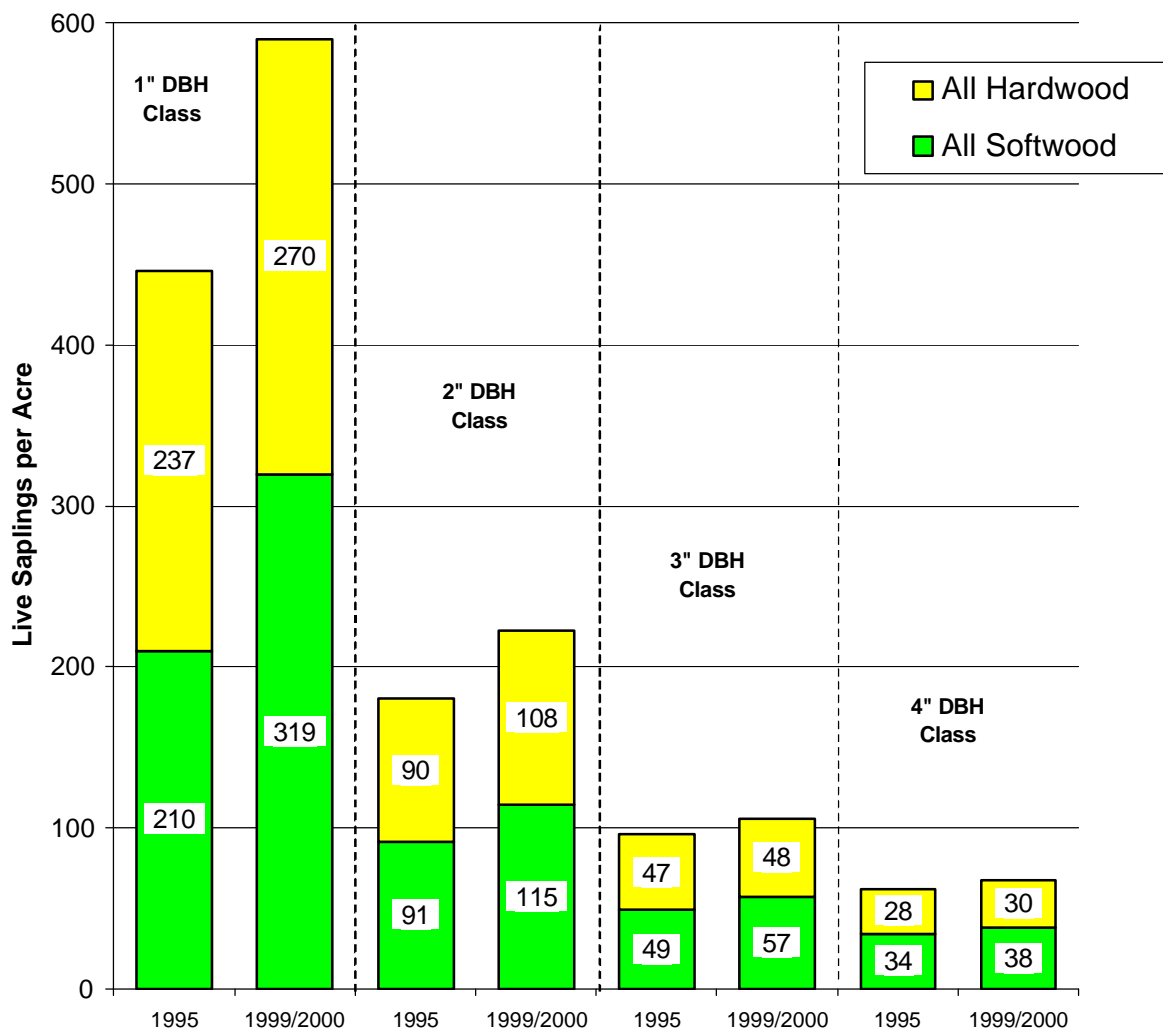
- The dynamics occurring in saplings are primarily attributable to changes in the average per acre stocking of softwood species, representing 72% of the overall increase since 1995 (Figure 3. And Figure 4. Hardwood and Softwood Saplings per Acre, comparison between the 1995 and 1999/2000 Inventory).

Figure 4. Hardwood and Softwood Saplings per acre, comparison between 1995 and the 1999/2000 Inventory



- Examining individual dbh classes, the bulk of the increased stocking occurs in the 1" dbh class (71%), followed by the 2" dbh class (21%); and within all four dbh classes, softwood species represents the plurality of the increase (Figure 5. Change in Live Saplings per Acre, 1995 – 1999/2000, by Softwood/Hardwood Groupings and by DBH Class).

Figure 5. Change in Live Saplings per Acre, 1995 - 1999/2000, by Softwood/Hardwood Groupings and by DBH Class



- **With additional data supplied by the USDA Forest Service, MFS is able to statistically test the significance of the previously discussed descriptive observations regarding Figure 4. And Figure 5.**

The 1999/2000 data estimates a major significant increase in the total number of saplings occurring on all timberland acres in the 1" and 2" dbh classes, and a marginal significant increase in the 3" dbh class. These increases are a reaffirmation of the successful regeneration of Maine's forests following the recent Spruce Budworm outbreak and associated concern on sustainable harvesting. Even more encouraging is that this wave of sapling stocking currently extends into the 3" dbh class, foretelling of merchantable ingrowth in another 10 years.

In addition the following species/species groups estimate significant stocking increases in their sapling dbh classes: Balsam Fir (+46%), Spruces (+38%), and Red Maple (+37%). Softwoods overall have a significant increase of 41% and hardwoods overall have a significant increase of 16% in stocking across the state (Table 16A. Number of Live Trees (1.0" – 4.9" DBH) on Timberland by Species/Species Group and DBH Class).

VOLUME

- **The combined estimate of growing stock volume is 22,764 million cubic feet and it is a significant increase from the 1995 estimate of 20,823 million cubic feet** (Appendix A. Table 19. Net Volume of Growing Stock Trees (5.0" dbh and larger) by Species/Species Group and Diameter Class Grouping.).
- **Between 1995 and the combined 1999/2000 estimates there are:**
 - **No significant differences in growing stock volume for any species/species group** (Appendix A. Table 19.).
 - **No significant differences in any of the three diameter class groupings** (Appendix A. Table 19.).
 - **No significant differences in sawtimber volume (million board feet) for any species/species group or diameter class grouping** (Appendix A. Table 27.).
 - **Significant increases occur in** (Appendix A. Table 23. Net Volume of All Live, Commercial Tree Species, Pulpwood Quality, Growing Stock, and Sawtimber Trees on Timberland by species group and Ownership Class.):
 - **Volume of all live softwood trees: +12%**
 - **Volume of all live trees (Total - All Live): +11%**
 - **Volume of commercial tree species (Total – Commercial Trees): +10%**
 - **Volume of pulpwood quality (Total – Pulpwood Quality): +11%**
 - **Volume of growing stock (Total – Growing Stock): +9%**
- **16.3 cords is the average volume per acre, of pulpwood quality or better trees. This is an increase of 1.3 cords from the 1995 estimate and 70% of the gain occurs in softwood species** (Appendix B. Figure 1.).
- **The combined inventory estimate of pulpwood quality trees or better is 23,905 million cubic feet (281 million cords). This is a significant increase (11%) in volume from the 1995 estimate of 21,597 million cubic feet (254 million cords). In Appendix B. Figure 2., it clearly depicts the power of doubling the sample size and its associated impact on the confidence interval around the current estimated mean of 281 million cords compared to the previous estimate based on just the 1999 Panel 1's data from 646 plots** (Appendix A. Table 23. And Appendix B. Figure 2.).

GROWTH

The combined estimate using all 1,371 plots and their representative sample area of 228.5 acres provides a valid snapshot of inventory in 2000. The available sample for growth consists of **only** 667 remeasured plots and their representative sample area of 27.8 acres. This very small and diverse sample size does not support a valid estimation of growth since the 1995 estimate. Although, growth data is anticipated to be available after the fifth year of measurements is completed in 2003, it will constitute an extremely weak estimate. This is due to a combination of two impacts: the low percentage of remeasured plots (~50% of the entire sample) and the small plot area remeasured (1/24 acre). The combined impact is that only roughly 12% of the data collected (1999 – 2003) will be of remeasurement quality.

MFS is currently implementing a plan and process to collect additional remeasured data from a subset of the plots measured in 1995, and currently retained as part of the five annual panels. The approximate 500 plots in this separate study will provide an independent benchmark and check to the growth estimated by the annualized FIA system following the 2003 measurement season.

ADDITIONAL INFORMATION:

<http://www.fs.fed.us/ne/fia/states/me/me.html>

For the following links:

- Highlights of the 1995 Maine Inventory
- To view distribution maps of 14 important species
- To view/print a copy(s) of the tables from the 1995 statistical report

<http://www.state.me.us/doc/mfs/pubs.htm>

For the following publications:

- Charts from Report of the 1999 Annual Inventory of Maine's Forests
- Report of the 1999 Annual Inventory of Maine's Forests

Glossary of Inventory Terminology

Forestland – Land at least 10% stocked by forest trees of any size, or land that formerly had such a tree cover and is not currently developed for a non-forest use.

Growing Stock

Or

Growing Stock Tree – A classification of timber inventory that includes live trees of commercial species meeting specified standards of quality and vigor. Cull trees (rough and rotten trees) are excluded. When associated with volume, includes only trees 5.0" dbh and larger.

Owner Class – A variable that classifies land into finer categories of ownership.

Forest Industry – Land owned by companies or individuals that operate wood-using plants.

Nonindustrial Private – Land owned by companies, non-governmental organizations, or individuals that do not operate wood-using plants.

Public – Land owned by federal, state, municipal, or county government.

Poletimber Tree – A tree that is at least 5.0" dbh, but smaller than sawtimber size trees.

Softwood Species: 5.0" – 8.9" dbh

Hardwood Species: 5.0" – 10.9" dbh

Potential Sawtimber (i.e. Sawlog Quality) Tree – A commercial tree species that is field coded as a growing stock tree but is below the minimum dbh for sawtimber (<9.0" for softwoods and <11.0" for hardwoods).

Pulpwood Quality Tree – A commercial tree species that is field coded as a growing stock tree or as a rough cull tree.

Rough Cull Tree – A live tree with less than 1/3 of its gross board foot volume coming from logs that meet size, soundness, and grade requirements; and more than 1/2 of the board foot cull is due to sound defects such as sweep, crook, etc. Or a live poletimber tree that prospectively will have less than 1/3 of its gross board foot volume coming from logs that meet size, soundness, and grade requirements; and more than 1/2 of the prospective board foot cull is due to sound defects such as sweep, crook, etc.

Sapling Tree – A live tree with a 1.0" – 4.9" dbh.

Sawtimber Tree (i.e. Sawlog Quality Tree) – Softwood trees that are at least 9.0” dbh or hardwood trees that are at least 11.0” dbh, that contain at least 1 – 12 foot log or 2 – noncontiguous 8 foot logs, that meet minimum sawlog grade specifications. In addition, the tree must have 1/3 or more of its gross board foot volume as merchantable material.

Species Group – as used in the Appendix A. Tables and in the annual report, species groups include the following species:

Group

Balsam Fir – Balsam Fir

Spruces – White Spruce, Red Spruce, and Black Spruce

Eastern White Pine – Eastern White Pine

Northern White Cedar – Northern White Cedar

Other Miscellaneous Softwoods – these merchantable sized (5.0” dbh and larger) species were tallied in 1999 or 2000: Plantation Larch, Tamarack, Norway Spruce, Jack Pine, Red Pine, Pitch Pine, Pond Pine, Scotch Pine, Hemlock

Red Maple – Red Maple

Sugar Maple/Beech/Birch – Sugar Maple, American Beech, and Yellow Birch

Intolerant Hardwoods – Paper Birch, Balsam Poplar, Eastern Cottonwood, Bigtooth Aspen, Quaking Aspen

Other Miscellaneous Commercial Hardwoods – these merchantable sized (5.0” dbh and larger) species were tallied in either 1999 or 2000: Maple species, Ohio Buckeye, Sweet Birch, White Ash, Black Ash, Green Ash, Butternut, Black Cherry, White Oak, Scarlet Oak, Northern Red Oak, Black Oak, American Basswood, American Elm

Noncommercial Hardwoods – these merchantable sized (5.0” dbh and larger) species were tallied in either 1999 or 2000: Striped Maple, Mountain Maple, Serviceberry, Gray Birch, American Hornbeam, Apple species, Eastern Hophornbeam, Pin Cherry, Chokecherry, Willow species, Black Willow, American Mountain-Ash

All Unknown Species – Tree Species-Unknown/Not Listed

Stand Size – A stand descriptor that indicates which size-class of trees constitutes the plurality of stocking in the stand. This variable is field assigned, and then is also calculated as part of the USDA Forest Service validation process. The calculated value is used to assign stand size classes in this report.

Large Diameter Stand Size Class is comprised of:

- $\geq 10\%$ stocking of trees of any size,
- $> 50\%$ stocking of trees with diameters ≥ 5.0 ” dbh, and
- Stocking of large diameter trees exceeds the stocking of medium diameter trees.

Medium Diameter Stand Size Class is comprised of:

- $\geq 10\%$ stocking of trees of any size,
- $> 50\%$ stocking of trees with diameters $\geq 5.0''$ dbh, and
- Stocking of medium diameter trees exceeds the stocking of large diameter tree.

Small Diameter Stand Size Class is comprised of:

- $\geq 10\%$ stocking of trees of any size, and
- $> 50\%$ stocking of trees with diameters $< 5.0''$ dbh.

Nonstocked Stand Size Class is comprised of:

- $< 10\%$ stocking of trees of any size

Small Diameter Trees – Trees with a dbh range of $1.0'' - 4.9''$

Medium Diameter Trees – For softwood species, this is a tree with a dbh range of $5.0'' - 8.9''$. For hardwood species, this is a tree with a dbh range of $5.0'' - 10.9''$.

Large Diameter Trees – For softwood species, this is a tree with a $9.0''$ dbh and larger. For hardwood species, this is a tree with an $11.0''$ dbh and larger.

Stocking – The relative degree of occupancy of land by trees, measured as basal area or the number of trees in a stand, by size, age, or spacing; as compared to the basal area or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

This variable is field assigned. In the USDA Forest Service data validation process, a national algorithm is used to calculate this variable. The calculated variable is used in this report.

The 5 stocking classes are:

Nonstocked	$< 10\%$ stocking
Poorly Stocked	$\geq 10\%$ Stocking and $< 35\%$ Stocking
Moderately Stocked	$\geq 35\%$ Stocking and $< 60\%$ Stocking
Fully Stocked	$\geq 60\%$ Stocking and $< 100\%$ Stocking
Overstocked	$> 100\%$ Stocking

Timberland – Forest that is producing or capable of producing crops of industrial wood and is not withdrawn from timber utilization by statute (Acadia National Park, Appalachian Trail Corridor) or administrative designation (Baxter State Park, Bureau of Parks & Lands Ecological Reserves). (Land withdrawn from timber utilization must be publicly owned land).

Areas qualifying as timberland have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood under management. Currently inaccessible and inoperable areas are included, except when the areas are small

and unlikely to become suitable for the production of industrial wood in the foreseeable future.

Timberland may be nonstocked provided that neither any natural condition, nor any activity by humans, prevents or inhibits the establishment of tree seedlings.

Rural – Defines a subset of forestland, which is now grouped into Timberland. This category represents the historical and traditional acreages classified as Timberland in previous inventories, and has the identical definition.

Other Forestland – Defines a subset of forestland, which is now grouped into Timberland. It is producing, or capable of producing, crops of industrial wood, but is associated with, or part of a nonforest land use. In the past, these areas would have been treated as inclusions in the nonforest land use because they were considered part of a development. The minimum area for classification as Other Forestland is one acre and these strips of timber must have a crown width at least 120 feet wide. Some examples of land that could be classified as Other Forestland are forested portions of city parks, forested land in highway medians and rights-of-way, forested areas between ski runs, and forested areas within golf courses. Generally, although surrounded by nonforest development, these areas have not been developed themselves, and exhibit natural, undisturbed understories.

Urban Forestland – Defines a subset of forestland, which is now grouped into Timberland. Land that except for its location would ordinarily be classified as timberland. This land is either nearly (surrounded on three sides), or completely, surrounded by urban development, whether commercial, industrial, or residential. This land meets all the criteria for timberland, that is, at least one acre; capable of producing at least 20 cubic feet per acre per year of industrial wood; is not developed for some use other than timber production; and is not reserved by a public agency. It is extremely unlikely that such land would be used for timber products on a continuing basis. Such land may be held for future development, or scheduled for development. (The timber that is present may be utilized only at the time of development.) The land may be undeveloped due to periodic flooding, low wet sites, steep slopes, or their proximity to industrial facilities that are unfavorable to residential development. Forested areas within city parks are not urban forestland; it may be Other Forestland, if the requirements are met. City Parks cannot be classified as Urban Forestland as it is currently defined.

APPENDICES

NOTE:

- a) All tables in this report may not add to the row, column, or table totals due to rounding.
- b) All estimates in this report are derived from ground plots, except where noted.